Management of hypervolemia in pediatric patients with AKI (*acute kidney injury):* a case study at RSUP Dr. Hospital

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Abstract
In 2022, Indonesia experienced a significant increase in cases of acute kidney failure in children. As of February 2023, more than 300 cases have been reported and half of them have resulted in death. One of the symptoms of AKI (Acute Kidney Injury) is excess fluid which is characterized by edema. Therefore, effective nursing interventions are needed to reduce excess fluid experienced by patients. The purpose of to determine the effectiveness of hypervolemia management in reducing hypervolemia in children with a medical diagnosis of AKI, and to provide comprehensive nursing care to children with AKI. This research method is using a case study method using a nursing care approach starting from assessment, formulation of nursing diagnosis, intervention, implementation, to nursing evaluation which was carried out for 3 days in the West Aster ward of Dr. Sardjito Hospital in pediatric patients with a medical diagnosis of AKI (*Acute Kidney Injury).* The results were obtained after the hypervolemia management of the patient underwent significant changes. The conclusion of this study is that hypervolemia management applied for 3 days can reduce hypervolemia in An.V.

Keywords: acute kidney injury; AKI; hypervolemia; hypervolemia management; nursing care

1. Background
One of the most important organs for maintaining body balance is the kidney. Kidney disease can impact the health of other organ systems, such as the lungs, heart, brain, and others, and can worsen a person's health. The kidneys also produce the enzyme renin, which is important for controlling blood pressure, and the hormone erythropoietin, which stimulates the bone marrow to produce red blood cells. The kidneys are also responsible for controlling fluid balance and maintaining a constant electrolyte balance (Kemenkes, 2022).

kidney injury (AKI) is the sudden loss of kidney function. Impaired kidney function prevents the body from clearing metabolic waste, controlling extracellular fluid volume, maintaining sodium balance, and maintaining acid-base balance (Aprina. et al., 2023). Patients with AKI experience disruptions in their basic fluid and electrolyte needs. The ability to control fluid, electrolyte, and acid-base balance is impaired when kidney tissue ceases to function properly. The body retains fluid due to impaired filtration and reabsorption, resulting in fluid loss. If the patient's fluid and electrolyte needs are not met adequately, patients with kidney failure can experience additional complications such as decreased body function and even death (Bagas et al., 2022).

Indonesia saw a significant increase in cases of acute kidney failure in children in 2022. As of February 2023, more than 300 cases had been reported, half of which resulted in death. These incidents were linked to the presence of diethylene glycol and ethylene glycol. Both are toxic, commonly used in coolants and should not be found in medicines. Furthermore, the high number of kidney failure cases also reflects low public awareness of kidney health. The lack of accurate information about kidney health and kidney failure is a contributing factor to the increasing number of people with acute kidney failure, which ultimately leads to chronic kidney failure (Wijayan et al., 2023).

Fluid management plays a crucial role in the management of acute renal failure in children. Fluid imbalance, whether in the form of hypervolemia or fluid overload, can directly contribute to patient morbidity and mortality. Fluid overload is not only a marker but also a mediator of poor outcomes in children, including those with acute renal failure (Basu, 2023). Fluid management can prevent complications and address fluid overload by restricting food and drink to reduce electrolyte and fluid levels (Mujiatun et al., 2021).

Due to the importance of fluid management in pediatric patients with acute renal failure to prevent complications and improve quality of life, nurses are expected to comprehensively manage any emerging issues. Based on this description, the author is interested in addressing this issue in her final

nursing paper entitled "Fluid Management in Pediatric Patients with Acute Renal Failure at Dr. Sardjito General Hospital, Yogyakarta."

2. Methods

This nursing final project utilizes a case study. The case study design employs a descriptive method, focusing on a patient at Dr. Sardjito General Hospital who was selected for the case study. This research encompasses assessment, nursing diagnosis, intervention, implementation, and evaluation. Nursing care was provided over a three-day period to a pediatric patient diagnosed with AKI in the West Aster Ward of Dr. Sardjito General Hospital.

3. Results and Discussion

3.1. Results

Based on the case management that has been carried out according to the stages of the nursing process, starting from assessment to evaluation, several aspects require analysis. The discussion covers the case management process, starting from the assessment stage, such as data collection, data analysis, formulation of nursing diagnoses, nursing interventions, implementation, and evaluation. Implementation was carried out on the patient for 3 days after the discovery of the nursing problem, namely hypervolemia.

3.1.1. Assessment

Assessment in nursing is a systematic process that aims to collect and analyze patient data to determine the severity of the patient's health condition and plan interventions that are appropriate to the patient's problems (Habibah et al., 2023). This assessment was conducted in Bangsar Aster Barat RSUP Dr. Sardjito with a patient with the initials An.V, a 7-year-old child. The patient was treated since December 10, 2024, the assessment was conducted since December 10, 2024 with a medical diagnosis of AKI (*Acute Kidney Injury)*.

A 7-year-old 10-month-old child was referred from Sarila Husada Regional Hospital with a diagnosis of hypertension and AKI for 3 weeks. Before being admitted from the hospital (11/18/2024), the child had a high fever and swelling in the lower jaw. There was no nausea and vomiting. Then the child was taken for treatment to the community health center. The child was given 3 kinds of medication, complaints improved. 1 week ago on December 1, 2024 the child complained of abdominal pain. The child was taken for treatment to the doctor. The child was given antacid medication and syrup medication, complaints of abdominal pain improved. 3 days before being taken to the hospital the child complained of swelling on the face, initially in the eyelids, then spread to both legs. On December 8, 2024 the child complained of dizziness. On December 9, the child had a seizure with a frequency of 1x duration of about 1-2 minutes, after the seizure the child felt weakness in the right leg since morning so that the leg had difficulty standing. The child was taken to the emergency room of Sarila Husada Hospital and the seizure in the emergency room had a frequency of 1x duration of 1 minute. The child was transferred to the inpatient ward and then experienced another seizure, with a frequency of one seizure lasting 30 seconds. He was then referred to the emergency room at Sardjito Hospital, where he was admitted at 1:00 a.m. WIB on December 10, 2024.

3.1.2. Nursing Diagnosis

Based on the assessment that has been conducted, a nursing diagnosis of hypervolemia is obtained related to regulatory mechanism disorders. This condition is characterized by edema in the face and legs, increased body weight, decreased HB levels, and a positive fluid balance. Hypervolemia is. In the Indonesian Nursing Diagnosis Standards (SDKI), hypervolemia has the code D.0022 and is defined as an increase in intravascular, interstitial, and/or intracellular fluid volume. Subjective data was obtained from the mother who said that the child experienced drastic weight gain, the face looked swollen or enlarged. Objective data obtained by the child appeared to have edema in the face and legs with edema grade 3.

3.1.3. Nursing Interventions

The appropriate nursing plan to address hypervolemia after nursing care for 3x24 hours is expected to improve fluid balance with the outcome criteria of decreased edema and improved body weight. The appropriate intervention for the diagnosis of hypervolemia is hypervolemia management because this intervention is the main standard intervention for hypervolemia nursing problems, which aims to manage excess intravascular and extravascular fluid volume and prevent complications.

3.1.4. Nursing Implementation

Nursing implementation is the stage in the nursing care process that involves implementing various planned nursing strategies. This implementation is carried out by nurses through a series of activities to help patients overcome their health problems and achieve optimal health (Rahmawati et al., 2024).

The implementation of nursing care for patients with hypervolemia is hypervolemia management. In this implementation, there are several interventions that are carried out or not carried out. This implementation is carried out for 3 days, where the interventions carried out in this implementation are checking for signs and symptoms of hypervolemia, identifying the cause of hypervolemia, monitoring hemodynamic status, monitoring fluid intake and output, monitoring the infusion rate strictly, limiting fluid and salt intake, elevating the head of the bed 30-40o , teaching the family how to measure and record fluid intake and output, teaching how to limit fluids, and collaborating on administering furosemide 1cc/hour. According to Rahmawati in 2024, it was shown that the implementation of hypervolemia management nursing interventions for 3x24 hours can overcome the problem of hypervolemia associated with impaired regulatory mechanisms. Other studies say that hypervolemia management can reduce hypervolemia in pediatric patients with AKI (Mudhmainnah et al., 2024b).

3.1.5. Nursing Evaluation

Nursing evaluation is the activity of assessing the patient's response after nursing implementation and reviewing the nursing care provided, using indicators to determine whether the nursing goals have been achieved. This evaluation needs to be conducted continuously to determine whether the nursing interventions provided are effective and whether the plan needs to be changed or discontinued (Damanik, 2020).

The evaluation conducted in this case was a formative evaluation in the form of SOAP. Based on the data obtained from the evaluation, hypervolemia can be overcome, although the edema did not disappear, but the edema has been greatly reduced. In addition, the fluid balance carried out was -40. So it can be concluded that fluid management can overcome hypervolemia even though it does not cure the disease but is very helpful in reducing complaints in patients with acute renal failure. Hypervolemia management by monitoring intake, output, and fluid balance, monitoring hemodynamic status, limiting fluid intake according to Indonesian nursing intervention standards can improve edema found in patients with acute renal failure (Wulan Sari & Cyntia Kasih, 2024). Another study with a case study in patients with hypervolemia conducted hypervolemia management for 5 days found that the hypervolemia problem could be resolved (Syah Rizki et al., 2024).

3.2. Discussion

Management of hypervolemia in pediatric patients with *Acute Kidney Injury* (AKI) is crucial for preventing more serious complications resulting from fluid retention. Impaired kidney function can prevent the body from excreting excess fluid and electrolytes, leading to edema and weight gain. Fluid overload in children is not only a symptom or clinical indicator but can also worsen morbidity and increase the risk of mortality. Management of hypervolemia in children with AKI is crucial not only for alleviating acute symptoms but also for preventing progression to *Chronic Kidney Disease (CKD)* (Rahmah et al., 2022). Therefore, fluid management strategies such as restricting fluid intake, a low-salt diet, hemodynamic monitoring, and the use of diuretics are crucial. Nurses play a crucial role in closely monitoring fluids to minimize these risks.

A comprehensive assessment process is crucial for identifying signs and symptoms of hypervolemia. This assessment includes monitoring intake and output, vital signs, daily weight, and observing edema. An accurate and systematic initial assessment is crucial for determining the effectiveness of nursing interventions (Habibah et al., 2023). Interventions based on appropriate

assessments, such as hemodynamic monitoring and collaborative diuretic administration, significantly reduced symptoms of hypervolemia during the first three days of care. This underscores the importance of a comprehensive and ongoing assessment process in the care of children with *acute kidney injury* (Mudhmainnah et al., 2024a).

Nursing evaluation is the final and crucial stage, as it determines the success of the nursing implementation. Nursing evaluation also underpins the importance of determining the continuation or change of the nursing care plan. With proper evaluation, hypervolemia management not only reduces the patient's physical complaints but can also improve the overall prognosis (Damanik, 2020). A study showed that fluid management for 3 to 5 days successfully improved fluid balance and reduced edema in patients with AKI (Sari & Kasih, 2024). The evaluation in this case, conducted over 3 days with hypervolemia management, was able to address hypervolemia in pediatric patients with AKI.

4. Conclusion

After providing hypervolemia management nursing care, which aims to reduce the occurrence of hypervolemia in pediatric patients diagnosed with AKI, hypervolemia can be reduced by reducing edema. Therefore, it can be concluded that hypervolemia can be partially resolved with hypervolemia management carried out for 3 x 24 hours.

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References

Aprina., Mahayaty, L. , Dary., Amelia, L. , Sukmandari, N. M. A. , Mariyam., Suek, O. D. , Astarani, K. , & Suprihatin, K. , & S. N. L. K. (2023). *Buku Ajar Anak S1 Keperawatan*.

Bagas, O., Wibawa, A., & Sebayang, S. M. (2022). *PENERAPAN MANAJEMEN CAIRAN PADA PASIEN NY. R. DENGAN HIPERVOLEMIA AKIBAT GAGAL GINJAL KRONIK DI RUMAH SAKIT ISLAM BANJARNEGARA* (Vol. 3, Issue 6).

Basu, R. K. (2023). *Fluid management in critically ill children with acute kidney injury*. https://doi.org/10.3389/fped.2023.997763

Damanik. (2020). Potensi Evaluasi Keperawatan Dijadikan Rekomendasi dalam Memberikan Asuhan Keperawatan di masa yang Mendatang. *Ilmu Kedokteran Dan Kesehatan*.

Habibah, F., Yuliana, N., Putri, E., Widyawati, I. Y., & Mirzanah, S. (2023). *PENGKAJIAN TINGKAT KEPARAHAN CSA-AKI BERDASARKAN KRITERIA KDIGO: LITERATURE REVIEW*. http://journal.stikeskendal.ac.id/index.php/Keperawatan

Kemenkes. (2022). *Tips Jaga Kesehatan Ginjal*. https://yankes.kemkes.go.id/view_artikel/846/tips-jaga-kesehatan-ginjal

Mudhmainnah, Harahap, & Septiana. (2024a). ASUHAN KEPERAWATAN PADA ANAK DENGAN GAGAL GINJAL AKUT DI RUANG PEDIATRIC INTENSIVE CARE UNIT: STUDI KASUS. *Jurnal Ilmiah Mahasiswa Fakultas Keperawatan, 8(2)*.

Mudhmainnah, N., Harahap, I. M., & Septiana, N. (2024b). *ASUHAN KEPERAWATAN PADA ANAK DENGAN GAGAL GINJAL AKUT DI RUANG PEDIATRIC INTENSIVE CARE UNIT : STUDI KASUS Nursing Care for Patient with Acute Kidney Failure: A Case Study*.

Mujiatun, R., Heri Susanti, I., Sumarni, T., Studi Keperawatan Program Diploma III, P., Kesehatan, F., & Harapan Bangsa, U. (2021). *Gambaran Kelebihan Volume Cairan pada Pasien Ny. Y dengan Kasus Gagal Ginjal Kronis di Desa Ledug Kecamatan Kembaran*.

Rahmah, A. N., Sari, E. A., & Fitria, N. (2022). Management of Hypervolemia In Chronic Kidney Disease Stage 5 At Sumedang Hospital: A Case Study. In *Padjadjaran Acute Care Nursing Journal* (Vol. 3, Issue 2). http://jurnal.unpad.ac.id/pacnj

Rahmawati, I. M., Sumarni, T., & Khasanah, S. (2024). *Penerapan Manajemen Cairan Pada Pasien Dengan Hipervolemia Akibbat Gagal-Ginjal Kronik di rumah Sakit Banjarnegara*.

Sari, W., & Kasih, C. (2024). Asuhan Keperawatan pada Pasien dengan Gagal Ginjal Akut: Studi Kasus. *Jurnal Keperawatan Medika, 3(1)*.

Syah Rizki, S., Novariza, R., Silvia Devi, D., Keperawatan, D., Psikologi dan Kesehatan, F., & Negeri Padang, U. (2024). Pemberian Terapi Kompres Hangat dan Dingin Pada Pasien Dengan Acute Kidney Injury. In *Jurnal Keperawatan Medika* (Vol. 3, Issue 1).

Wijayan, L., Damawiyah, Septianingrum, Y., & Hasina, S. N. (2023). *PEMBERDAYAAN KADER KESEHATAN DALAM DETEKSI DINI DAN EDUKASI PENCEGAHAN PENYAKIT GINJAL KRONIK*.

Wulan Sari, M., & Cyntia Kasih, L. (2024). *ASUHAN KEPERAWATAN PADA PASIEN DENGAN GAGAL GINJAL AKUT: STUDI KASUS Nursing Care on Patients With Acute Kidney Disease: A Case Study*.